2020
RESEARCH SYMPOSIUM PROGRAM
&
RESIDENT ABSTRACTS

INTERNATIONAL COLLEGE OF DENTISTS ANNUAL RESEARCH AWARD COMPETITION

NAVAL POSTGRADUATE DENTAL SCHOOL
NAVY MEDICINE PROFESSIONAL DEVELOPMENT CENTER
BETHESDA, MARYLAND

19-20 MAY 2020

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JUDGES

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JUDGES

Susan B. Rasmussen, BS, PhD

Dr. Rasmussen is an experienced researcher, educator and administrator. She is presently the Health Scientist Administrator in the Office of Research at Uniformed Services University of the Health Sciences (USUHS). Her understanding of the research process began as an instructor and junior researcher at the University of Florida. Her interests in the structural aspects of protein function with applications in the fields of biology, chemistry and microbiology led her to complete a postdoctoral fellowship at the National Cancer Institute, National Institutes of Health and serve as the laboratory manager in the Dept. of Microbiology at USUHS. She previously was Director at both the Office of Program Development and Office of Sponsored Programs at the University. These departments support and administrate basic intramural medical research by facilitating faculty recruitment and retention, encouraging unique research training opportunities for military medical students, residents, and fellows and allowing faculty researchers to collect pilot data towards military relevant medical research projects in order to secure extramural funding sources (estimated $175 million annually). She has evaluated and scientifically reviewed research grant applications and has participated in multiple grant review panels for granting agencies. Dr. Rasmussen has authored or co-authored 14 papers, 1 book chapter and is a member of the American Chemical Society, Iota Sigma Pi and the American Society for Microbiology.

David L. Evers, BS, PhD

Dr. Evers earned his B.S. in Chemistry from the University of Minnesota and Ph.D. in Medicinal Chemistry from the University of Michigan. His laboratory research career includes the mechanism of antiviral drugs active against herpesviruses, analytical methods, molecular retrieval from formalin-fixed paraffin-embedded tissue, and the detection of bacterial toxins. He has authored or co-authored more than 30 publications and holds a certificate in regulatory compliance from Hood College. More recently, his interests in drug development and regulatory compliance drew him to pursue a position as IRB Manager in WRNMMC Department of Research Programs where he works with the expedited review team. He lives in Gaithersburg, loves to write, and enjoys copper-foil stained glass.

Stephen M. Pachuta, RDML (Ret), BA, DDS, MS

Dr. Pachuta is a 1985 graduate of the West Virginia University School of Dentistry. He completed residency training in comprehensive dentistry at the Naval Postgraduate Dental School in Bethesda, Maryland and earned a Master of Science in Health Sciences from The George Washington University. He served as a Rear Admiral in the United States Navy and is recognized as an experienced senior health care executive with a significant background leading large, diverse health care organizations. His senior military assignments included Director for Medical Resources, Plans and Policy for the Navy; Director for Health Services, Headquarters Marine Corps; and 37th Chief of the Navy Dental Corps. He served as the Executive Assistant and Senior Policy Advisor to the Surgeon General of the Navy and commanded (CEO responsibilities) the Naval Hospital in

Yokosuka Japan. He is board certified by the American Board of General Dentistry and is recognized as a Fellow in the American College of Dentists and the International College of Dentists. He maintains membership in the American College of Healthcare Executives, the American Dental Association, the Academy of Operative Dentistry and the Academy of General Dentistry. Dr. Pachuta was recognized by the American Hospital Association with the 2011 Federal Health Care Executive of the Year Award for Excellence. He serves on the Board of Regents of the American College of Dentists and is currently a graduate student in Bioethics at the Neiswanger Institute for Bioethics at Loyola University Chicago.

Michael S. Valerio, BS, PhD

Dr. Valerio, a native of Rochester NY, received his PhD in Nutritional Biochemistry and Exercise Physiology from the University at Buffalo in 2010. His PhD work focused on dietary lipids as immune modulators in inflammatory disease. After earning his PhD, Michael was awarded an NRSA NIH T32 Postdoctoral Training Grant under the direction of Keith Kirkwood, PhD, DDS, a Periodontist and molecular Biologist at the Medical University of South Carolina (MUSC) in Charleston, SC. There, Michael's postdoc training focused on bone biology and Osteoimmunology where he studied regulatory aspects of physiologic vs pathogen-driven osteoclast formation and subsequent bone turnover. For his efforts, Michael was awarded the prestigious AADR/IADR Hatton Award and was invited to Cape Town South Africa to present his work internationally. Also during his time at MUSC, Michael was appointed as Course Director of a Nutrition and Biochemistry course taught to first year dental students at MUSC. Additionally, after his postdoctoral training, Michael was appointed as faculty in the Department of Oral Health Sciences at MUSC. After some time, Michael left academics following a job offer at the American Dental Association (ADA), where he served as biomedical liaison and Senior Manager on basic and translational science topics for the Science division at ADA. Next, Michael took an offer to join the ADA Foundations Volpe Research Center at NIST in Gaithersburg, MD. Here he utilized his expertise in regulation of inflammation and Osteoimmunology to develop materials with world-class materials scientists to be used to restore bone and soft tissue. For these efforts, Michael and his colleagues have a patent pending on a novel bone restorative and immune modifying material. Most recently, Michael joined WRNMMC and USUHS through the Extremity Trauma and Amputation Center of Excellence (EACE) in 2018. Michael was brought on for his expertise in bone biology and experience with bone restorative materials. At EACE he and his group focus on pre-clinical modeling and development of regenerative medicine therapeutics for musculoskeletal injuries.   In his spare time, Michael likes cooking, being physically active outdoors, biking, hiking, fishing and traveling.

PRESENTATION SCHEDULE FOR RESEARCH COMPETITION
NAVAL POSTGRADUATE DENTAL SCHOOL, BETHESDA, MD

Tuesday, May 19, 2020

TIME	RESIDENT	TITLE
0800		Welcome and Opening Remarks
0815	LCDR Alyse D. Fleming	The Effect of Smear Layer Removal on Endodontic Outcomes
0830	LCDR Thien T. Nguyen	Oral Health in a United States Military Population Diagnosed with GERD
0845	LT Wei Liu	Effect of Ultrasonic Vibration on Voids in Core Buildup Materials
0900	LCDR Russell L. Neal	Comparison of Preoperative Methylprednisolone and Ibuprofen on Mandibular Anesthetic Efficacy
0915	LCDR David S. Yi	Stress Assessment in Post-Graduate Dental Residency

0930-0945 Break

TIME	RESIDENT	TITLE
0945	CDR Andrew D. Silvestri	Effects of Antero-Posterior Incisor Position on Attractiveness Ratings by Ethnicity
1000	LCDR Kerry B. Baumann	Distribution of Human Tongue Adipose and Obstructive Sleep Apnea
1015	LCDR Ryan A. Hershey	Efficacy of Reference Object Calibration for Off-Angle Radiography
1030	LCDR Jennifer C. Steigerwald	Heart Rate Variability in Moderate Obstructive Sleep Apnea
1045	LCDR Kristofer S. Harris	Sterilization of Endodontic Files/Gutta-Percha Cones Using 8.25% Sodium Hypochlorite

Resume on Wednesday May 20, 2020 0800

TIME	RESIDENT	TITLE
0800	LCDR Omeed A. Rezaie Tirabadi	Relationship Between BMI/Physical Activity and Burnout in Dental Residents
0815	LT Diewitt Duong	Effect of Arch Shape on the Accuracy of Intraoral Scanners
0830	LCDR Christian P. Lares	Fracture Resistance of Glass-Ceramic and Zirconia Crowns after Endodontic Access
0845	LCDR Michael J. Lewis	Outcome of Endodontically Treated Cracked Teeth
0900	LT Allison D. Weinberg	Characterization of Titanium Implant Surfaces after ND:YAG Laser Treatment
0915	CDR Robert G. Holmes	Marginal Fit of CEREC Crowns at Different Interproximal Margin Angles

0930-0945 Break

TIME	RESIDENT	TITLE
0945	LCDR Matthew E. Seedall	Identifying Molecular Driver Events in Acinic Cell Carcinoma
1000	LCDR Sara A. Chilcutt	The Effects of Therapy Dogs on Patients with Dental Anxiety
1015	LCDR Gabrielle K. Jung	*Candida albicans* Attachment to 3D-Printed, CAD/CAM-Milled, and Conventional Denture Resin
1030	Maj John E. Dinan	Pain Catastrophizing in the Orofacial Pain Population
1045	LCDR Eric R. Draper	Optimized Tissue Preparation Technique in a Chronic Graft-Versus-Host Disease Model

THE EFFECT OF SMEAR LAYER REMOVAL ON ENDODONTIC OUTCOMES
LCDR Alyse D. Fleming, DC, USN

Introduction: A layer of organic and inorganic debris referred to as the smear layer is produced during mechanical instrumentation of the root canal system. The combination of ethylene-diamine-tetraacetic-acid (EDTA) and sodium hypochlorite (NaOCl) has been shown to effectively remove the smear layer. To date, no prospective controlled in vivo studies have been published regarding the effect of smear layer removal on endodontic outcomes in permanent teeth. **Objectives**: The purpose of this randomized, prospective, double-blinded clinical trial was to compare the outcomes of teeth where the smear layer was either removed or left intact. A secondary analysis assessed the influence of covariate factors on healing. **Methods**: Following inclusion criteria compliance and subjects' enrollment, random assignment to one of two (group A or B) irrigation protocols was made. Standardized instrumentation followed by assigned final irrigation protocol was completed for each subject with either 1ml of 17% EDTA or 1ml of 0.9% saline. Clinical and radiographic evaluations were completed no earlier than 12-months post-treatment to assess outcome differences. Modified periapical index (PAI) score (1-5) was used for radiographic analysis using Fisher's exact test ($p<0.05$). **Results**: An interim analysis of 205 subjects revealed no significant difference between the irrigation protocol groups ($p=0.37$). Pre-operative necrosis ($p=0.01$), pre-operative apical lesion ($p<0.0001$) and pre-operative diabetes ($p=0.02$) were found as the only covariates affecting healing rates. **Conclusion**: Within the limitations of this in-vivo clinical study, removal of the smear layer did not affect endodontic outcomes.

ORAL HEALTH IN A UNITED STATES MILITARY POPULATION DIAGNOSED WITH GERD
LCDR Thien T. Nguyen, DC, USN

Introduction: Gastroesophageal reflux disease (GERD), affecting 20% of adults in the United States (US), is a chronic disorder caused by retrograde movement of gastric acid into the esophagus and oral cavity. Following chronic exposure to gastric refluxate, dental erosion (DE) and changes in gingival health (GH) can occur. Currently, there are no studies evaluating DE and GH in a US military population diagnosed with GERD. The aim of this collaborative study was to perform a comprehensive medical and dental evaluation of active duty and retired US service members with GERD. **Methods**: Six human subjects diagnosed with GERD were enrolled (IRB: WRNMMC-2019-0252). A questionnaire was used to obtain the subjects' date of GERD diagnosis, frequency of dental visits, and oral, dietary, and social habits. Visual dental examination was performed to record DE and GH, and gingival crevicular fluid (GCF) and saliva were collected for pH analysis. **Results**: Utilizing Eccles erosion index, 50 teeth (65%) were Grade 0, 25 teeth (32.5%) were Grade 1, 2 teeth (2.5%) were Grade 2, and no teeth met criteria for Grade 3. Gingival Index scoring revealed 50 teeth (65%) as Grade 0, 16 teeth (20.7%) as Grade 1, 11 teeth (14.3%) as Grade 2, and no teeth as Grade 3. The average pH of GCF from teeth with DE was 6.82+/-0.16, and the average pH of unstimulated saliva from GERD subjects was 5.09+/-0.55. Maxillary incisors and maxillary posterior teeth were the most common sites for DE and gingivitis, respectively. **Conclusion**: Data suggests that our study population has comparable GH, marginally higher DE grading, and lower salivary pH when compared with a civilian population. Although the clinical impact deserves more exploration, our study is first to report the pH of GCF in a GERD population.

EFFECT OF ULTRASONIC VIBRATION ON VOIDS IN CORE BUILDUP MATERIALS
LT Wei Liu, DC, USN

Introduction: The core buildup procedure is often utilized to restore teeth with limited remaining coronal tooth structure. Voids have been observed radiographically within glass-ionomer and resin-based core materials, potentially compromising the mechanical strength of the fully restored tooth. The presence of large or numerous voids may require buildup replacement before a final restoration can be delivered. **Objective**: The purpose of this *in vitro* study was to determine whether applying an ultrasonic vibration technique during core buildup placement will reduce the presence of radiographically detectable voids. **Methods**: One hundred and twenty 3D-printed acrylic resin mandibular premolar analogs were fabricated and randomly assigned to four groups (n=30/group). Glass ionomer (Fuji IX) and resin (Gradia Core) materials were placed with or without vibration during placement. Final core buildups were assessed radiographically using XrayVision DCV software and rated by three independent and calibrated clinicians based on a four-category scale for presence and size of voids. Ordinal logistic regression and Chi-square tests for trend were used to compare radiographic void scoring in vibrated versus control samples within each material type. Fleiss' kappa was used to evaluate inter-rater agreement. **Results**: In an ordinal logistic regression model of void severity rating as the outcome, a significant interaction was found between glass ionomer or resin and the use of ultrasonic vibration ($p = 0.03$). Vibration was associated with poorer void severity ratings in glass ionomer ($p < 0.01$). Fleiss' kappa was 0.36 (fair agreement) when comparing all severity ratings between the three raters. **Conclusion**: Applying ultrasonic vibration resulted in worse ratings for radiographic presence of voids in glass ionomer compared to control. No effect of vibration was found in the resin group. These results suggest that the application of ultrasonic vibration during core buildup placement may not be clinically advantageous in improving restorative outcomes.

COMPARISON OF PREOPERATIVE METHYLPREDNISOLONE AND IBUPROFEN ON MANDIBULAR ANESTHETIC EFFICACY
LCDR Russell L. Neal, DC, USN

Introduction: Pain management is a critical component for a successful appointment during endodontic procedures. The most common method for delivering mandibular pulpal anesthesia is an inferior alveolar nerve block (IANB). Success rates for achieving adequate pulpal anesthesia range from 25% to 90%. Symptomatic irreversible pulpitis activates the inflammatory response and increases the production of pain producing neuropeptides and anesthetic resistant sodium channels. A prominent theory for anesthetic failure is the presence of pulpal inflammation. Recent clinical trials and systematic reviews have shown an increase in successful anesthesia using a preoperative nonsteroidal anti-inflammatory drug (NSAID). Furthermore, a clinical trial using a low dose corticosteroid in comparison to an NSAID found a greater increase in IANB efficacy with the corticosteroid in asymptomatic patients. **Objective:** This prospective, double-blind, randomized clinical trial compared the effectiveness of ibuprofen to methylprednisolone on IANB anesthetic efficacy in patients diagnosed with symptomatic irreversible pulpitis. **Methods:** Patients meeting inclusion criteria were enrolled. Subject baseline pain was recorded using a 0-100mm visual analog scale (VAS). Subjects then received either 800mg ibuprofen or 40mg methylprednisolone (identical capsules formulated in an investigational pharmacy). After forty-five minutes, 54mg of 2% lidocaine, 1:100,000 epinephrine was administered. Fifteen minutes later subjects were questioned for lip anesthesia. If lip anesthesia was achieved, the endodontic procedure was initiated. If not, subjects were excluded from data collection. If pain occurred during treatment, subjects rated their pain on a VAS. Supplemental anesthesia was administered for pain rated greater than mild (>50-100mm). **Results:** Subject enrollment is continuing; one has completed the study. **Conclusion:** Corticosteroids are more potent anti-inflammatories than NSAIDs. Their use has been clinically proven to alleviate post-endodontic pain and show promise in increasing IANB efficacy for symptomatic patients.

STRESS ASSESSMENT IN POST-GRADUATE DENTAL RESIDENCY
LCDR David S. Yi, DC, USN

Introduction: Dentists in residency training face many challenges and stressors that parallel those experienced by medical residents. The amount and level of stress may lead to burnout, a syndrome that includes emotional exhaustion, depersonalization, and reduced personal accomplishment. While plenty of literature exists documenting perceived stress and its respective physiological markers for physicians and students, there are limited studies that focus on dental residents. **Objectives**: The purpose of this ongoing study is to determine the severity of perceived and physiological stress experienced by dental residents over the course of residency training. A secondary aim is to explore associations among stress and psychological factors (e.g., anxiety, depression, social support) over the course of residency training. **Methods**: This prospective study includes dentists from one-, two-, or three-year residency programs at Naval Postgraduate Dental School. Baseline study assessments were collected via self-report measures and a brief physiological evaluation. Residents (n=16; 9 male, 7 female) were reassessed quarterly to track changes in measurements during the first 18 months of their programs. **Results**: Perceived stress increased from baseline values but did not exceed moderate levels and peaked after six months in residency (p>0.05). Physiologically, all residents showed a steady decline in parasympathetic activity over residency, but this finding was also not statistically significant (p>0.05). Higher depression and anxiety scores were associated with increased levels of perceived stress (p<0.05), while social support measures had an inverse relationship with perceived stress but was not statistically significant (p>0.05). **Conclusion**: Although dental residents reported only low to moderate levels of perceived stress over the course of the study, results suggest the ability to keep physiological stress response in balance decreased over time. Further, results suggest that low psychological distress and strong social support may act as protective factors to perceived stress.

EFFECTS OF ANTERO-POSTERIOR INCISOR POSITION ON ATTRACTIVENESS RATINGS BY ETHNICITY
CDR Andrew D. Silvestri, DC, USN

Introduction: Establishing a harmonious facial profile is a major objective in orthodontic treatment. As L.F. Andrews proposed, excessive protrusion of the maxillary incisors can preclude an esthetic result. However, this finding was based on studies utilizing a population of Caucasians, and it is unclear if this true in other populations. **Purpose**: To determine if the ethnicity of either the model or evaluator influence subjective ratings of facial attractiveness when evaluating various antero-posterior positions of maxillary incisors. **Methods:** Smile profile photographs of three female models, each of different ethnicity - Caucasian, African American, and Asian - were obtained and digitally manipulated to move maxillary incisors anteriorly by 2mm, 4mm, and 6mm, and posteriorly by 2mm. One hundred fifty layperson evaluators (50 Caucasian, 50 African American, 50 Asian) rated attractiveness of the images using a 0-100mm visual analog scale. **Results:** Generally, attractiveness decreased as incisor protrusion increased for all models by all evaluators, regardless of ethnicity. Analysis confirmed a highly significant overall effect of incisor position (p<0.0001). When considering ethnicity, there was no moderating effect (incisor position preference determined by evaluator ethnicity) (p=0.25) or main effect (same compared to different ethnicity) (p=0.80). There was a preference by all evaluators for -2mm compared to baseline (0mm) for the Asian model, and baseline compared to +2mm for the African American model (p<0.0001). Evaluators preferred all three models at baseline when compared to +4mm and +6mm images (all p values<0.0001). **Conclusions:** Evaluator ethnicity had no effect, and model ethnicity had a minimal effect on perceived attractiveness at various incisor positions. All evaluators - Asian, African American and Caucasian - considered incisor protrusion beyond 2mm detrimental to facial attractiveness. A slightly retrusive incisor position was preferred for the Asian model by all evaluators.

DISTRIBUTION OF HUMAN TONGUE ADIPOSE AND OBSTRUCTIVE SLEEP APNEA
LCDR Kerry B. Baumann, DC, USN

Introduction: Obstructive Sleep Apnea (OSA) is prevalent in the United States, presents serious health risks and is directly correlated with obesity. Treatment options are limited by patient compliance and risks associated with surgical procedures. Adipose reduction may offer a less invasive treatment modality. Airway obstruction, related to tongue adiposity, represents a more accessible location to reduce adipose as potential treatment for OSA. **Objective:** This study compiled complete histologic examinations of the entire tongue to determine locations of adipose tissue. **Methods:** Six cadaver (3 full and 3 partial) tongues were sectioned into anterior, middle and posterior. These were further sectioned into medial and lateral. Finally, these 6 sections were divided (microscopically) into dorsal and ventral to produce 12 distinct regions. The tissues were histologically prepared and examined using light microscopy (2x or 4x magnification) to quantify the percentage and volume (mm^3) of adipose. Data were analyzed using analysis of variance (ANOVA). **Results:** This study demonstrated the ventral portion of the tongue had a significantly higher ($p<0.001$) concentration of adipose tissue compared to the dorsal tongue and in particular within the middle and posterior thirds. **Conclusion:** The highest concentration of adipose was found in the ventral half and middle and posterior thirds of the tongue. Knowledge of tongue adipose concentrations could provide crucial information to guide targeted therapies directed at tongue size to relieve airway obstruction in the treatment of OSA in the United States population.

EFFICACY OF REFERENCE OBJECT CALIBRATION FOR OFF-ANGLE RADIOGRAPHY
LCDR Ryan A. Hershey, DC, USN

Introduction: Radiography is a critical element in the diagnosis and treatment of endodontic procedures. Periapical radiography, however, has limitations due to distortion caused by sensor and source angulation as well as the penumbra effect. This distortion, if not accounted for, can lead to inaccurate measurements when using in-software digital measuring tools. **Objective**: To compare the accuracy of the sensor calibration method to reference object calibration method when using the digital measuring tool. **Materials & Methods**: Radiographs were captured varying the angulation of the radiation source (0°, 15°, and 30°) and sensor (0°, 15°, 30°, and 45°) in relation to a pair of target objects. All radiographs were randomized for review by a board-certified endodontist. Preliminary measurements were recorded using a sensor calibration method, and then re-calibrated using a reference object in the radiograph. **Results**: Utilizing the sensor calibration method a 7.57% magnification was found even in a parallel relationship. The range of distortion error for sensor calibration throughout all conditions was between 1.54% and 102.70%. The reference calibration method was significantly better at all angles, having a range of distortion error between 0.22% and 1.30%. **Conclusion**: The use of the reference calibration method was found to greatly improve the accuracy of the measuring tool to less than 1.3% across all angulation conditions.

HEART RATE VARIABILITY IN MODERATE OBSTRUCTIVE SLEEP APNEA
LCDR Jennifer C. Steigerwald, DC, USN

Introduction: Heart rate variability (HRV) is the variation in the interval between consecutive heart beats. This allows the cardiovascular system to respond to sudden changes in physical demands, which is required for cardiovascular balance. Obstructive sleep apnea (OSA) occurs when pharyngeal muscles relax during sleep causing upper airway collapse, restricting airflow. Low blood oxygenation (hypoxemia) is a result. Repeated hypoxemias trigger autonomic nervous system (ANS) imbalance, causing systemic inflammation, endothelial dysfunction and altered metabolism. The ANS has direct modulating effects on HRV. HRV is reduced in OSA patients; many agree this ANS imbalance contributes to cardiovascular disease, a recognized long-term sequela of OSA. Time-domain and frequency-domain analysis of HRV can be difficult and require specialized skill. Poincaré plot analysis has been proposed as a simplified alternative method. **Objective**: Evaluate differences in HRV between patients with moderate OSA and without OSA using Poincaré plots. **Methods**: Polysomnography data was gathered retrospectively of 20 patients with moderate OSA and 20 without OSA. Poincaré plots were generated and three data points of each collected; length, width and area. Data were analyzed using single and multiple linear regression models. **Results**: Standard deviation (SD) regression coefficients revealed no significant difference in all HRV parameters ($p>0.05$). When age, sex and BMI were controlled for, the adjusted difference in SD was significant for all three parameters ($p<0.05$). **Conclusions**: There is a significant difference in HRV when controlling for confounding factors such as age, sex and BMI. Previous research evaluating HRV in OSA using Poincaré plots is limited. This study adds evidence that HRV is altered in patients with moderate OSA compared to those without OSA. It also highlights the Poincaré plot as simple and potentially valuable in measuring treatment outcomes which could be useful in multi-disciplinary care since OSA is commonly treated by both physicians and dentists.

STERILIZATION OF ENDODONTIC FILES/GUTTA-PERCHA CONES USING 8.25% SODIUM HYPOCHLORITE
LCDR Kristofer S. Harris, DC, USN

Introduction: Sodium hypochlorite is now available in a higher concentration of 8.25%. No research has been published examining this higher concentration's effectiveness in sterilizing endodontic files and gutta-percha cones. **Objective**: The purpose of this in-vitro study was two-fold: to determine the percentage of bacterial contamination of files and cones taken directly from their packaging and to determine if files and cones inoculated with *Staphylococcus epidermidis* could be sterilized by immersion in 8.25% sodium hypochlorite. **Methods:** Part 1: 100 files and 100 cones were transferred from original packaging into individual sterile tubes containing 10 ml of sterile broth, incubated for 72 hours and examined for turbidity. Part 2: 300 files and 300 cones were inoculated with *Staphylococcus epidermidis* followed by immersion in 8.25% sodium hypochlorite. Files were immersed for 1, 2, or 5 minutes and cones for 30, 45, and 60 seconds. Files and cones were transferred, incubated, and examined as described in part 1. Fisher's exact test compared frequencies of turbidity by immersion time and post-hoc comparisons were completed to determine significance in turbidity by brand ($P<0.05$). **Results:** 3 out of 100 files and 3 out of 100 cones produced turbidity when tested directly from the manufacturer's packaging. File turbidity ranged from 3.0% after immersion for 2 minutes to 12.0% after immersion for 5 minutes with significant difference by immersion time when combining brands ($P=0.046$). Cone turbidity ranged from 0% after immersion for 45 sec to 9.0% after immersion for 60 sec with a significant difference in turbidity by immersion times when combining brands ($P<0.001$). **Conclusions:** Immersion in 8.25% sodium hypochlorite did not guarantee sterility at any time tested for either files or gutta-percha cones.

RELATIONSHIP BETWEEN BMI/PHYSICAL ACTIVITY AND BURNOUT IN DENTAL RESIDENTS
LCDR Omeed A. Rezaie Tirabadi, DC, USN

Introduction: Burnout is a stress-related entity that is highly prevalent in the health care field, with most existing studies looking at physicians and medical residencies and a dearth of data at present on dentists. The limited information to date has found a burnout prevalence of 40-50% among dental students at the undergraduate and postgraduate levels. Burnout has been linked to severe health consequences including heart disease and even premature death. It has also been shown to increase the incidence of medical errors, potentially putting patients treated by a burnout sufferer at risk. There is some evidence of a possible protective effect of physical fitness/activity. Various measures of physical fitness have been found to improve cardiovascular recovery from stress and reduce risk of burnout. **Objective**: The aim of this study is to explore the relationship between body composition, physical activity levels, and risk of burnout. **Methods**: Postgraduate dental residents (n=14; 9 males, 7 females) were followed during the first 18 months of residency training. Participants were assessed every three months using self-report measures of physical activity and symptoms of burnout. At baseline, all participants provided Body Mass Index (BMI). **Results**: Preliminary results of this ongoing study suggest a weak positive correlation between baseline BMI and burnout symptoms over time, but this association was not significant (p=0.16). A weak negative association was also found between overall physical activity and burnout symptoms (p=0.06). **Conclusions**: While preliminary data are inconclusive, these findings suggest regular physical activity during postgraduate dental residency training may serve as a protective mechanism against the severity of symptoms of burnout. Future studies could incorporate wearable fitness trackers to get a more accurate picture of physical activity and a more robust physical fitness assessment including VO2 max test for cardiorespiratory fitness and DEXA scan for body composition.

EFFECT OF ARCH SHAPE ON THE ACCURACY OF INTRAORAL SCANNERS
LT Diewitt Duong, DC, USN

Introduction: Intraoral digital impressions have prevalent use in modern dental treatment workflows as usage has expanded into orthodontic and multiple unit or full arch procedures. Research published on the accuracy of digital impressions mainly focused on the scan of a single model, and it is not clear if the arch shape will have any effect on the accuracy of digital impression. **Objective**: To assess different arch shapes on the accuracy (trueness and precision) of full arch digital impressions. **Materials and Methods**: Five models with varying arch shapes (tapered, tapered-ovoid, ovoid, ovoid-square, square) were scanned ten times each model using CEREC Omni-cam (Omni-cam) and the 3Shape Trios (Trios) intraoral scanners for a total of one hundred scans. The scans were compared using best fit analysis to a laboratory-based scan (trueness) and to each other (precision). **Results**: In unsigned trueness, Omni-cam had less deviation than Trios scanner (p<.0001), and a linear relationship in trueness due to arch shape (p<.0001), with tapered arch shape scanned more accurately than square arch shape. In signed trueness, Omni-cam was more accurate than Trios (p=.02), and a similar trend of tapered arch shape performing better than square arch shape (p=.006). For precision, the Omni-cam was superior than Trios (p<.0001), however, the most precision was found at ovoid arch shape, the least precision was found at the extremes (tapered and square) for Trios and only the square arch shape for Omni-cam (p<.0001). **Conclusions**: For trueness, a linear relationship was shown for both scanners with the lowest deviation at tapered, increasing through ovoid, and largest at the square arch shape. For precision, arch shape had a significant effect with the Trios with poorer precision at tapered and square arches. Only the square arch shape affected the Omni-cam's precision. Overall, the Omni-cam was more accurate than the Trios.

FRACTURE RESISTANCE OF GLASS-CERAMIC AND ZIRCONIA CROWNS AFTER ENDODONTIC ACCESS
LCDR Christian P. Lares, DC, USN

Introduction: Fracture resistance of monolithic all-ceramic restorations, specifically lithium disilicate and zirconia, may be compromised following endodontic access preparation. **Objective**: This *in vitro* study assessed the effect of endodontic access preparation and repair on the fracture resistance of milled monolithic all-ceramic restorations on a mandibular first molar model. **Methods**: Twenty monolithic mandibular first molar zirconia crowns and 20 monolithic mandibular first molar lithium disilicate crowns were milled and crystallized or sintered. The crowns were divided into four groups (n=10): monolithic lithium disilicate intact (MLI), monolithic lithium disilicate endodontically accessed and repaired (MLR), monolithic zirconia intact (MZI), and monolithic zirconia endodontically accessed and repaired (MZR). All crowns were adhesively cemented to duplicate mandibular first molar dies fabricated from continuous filament woven fiberglass bonded epoxy resin. Cemented crowns were stored in deionized water for 24 hours at 37°C. The crowns from the MLR and MZR groups were endodontically accessed, and the access restored with a resin-based composite. Crowns will be positioned onto a universal testing machine and a compressive load applied to the mesial marginal ridge until catastrophic fracture. Maximum compressive forces between groups will be compared using a T test or Wilcoxon test (α=0.05). **Results**: Mean fracture resistance (kN) will be determined for each group. Fracture resistance will be compared between intact and endodontically accessed crowns for each material type. Any differences between materials in the degree to which endodontic access affects fracture resistance will be determined. **Conclusions**: These results are expected to contribute to the body of current literature on the effects of endodontic access on the fracture resistance of full coverage monolithic all-ceramic restorations. Clinicians may consider these results when treatment planning endodontic access repair versus crown replacement.

OUTCOME OF ENDODONTICALLY TREATED CRACKED TEETH
LCDR Michael J. Lewis, DC, USN

Introduction: A "cracked tooth" is characterized by a discontinuity of enamel, dentin, and possibly cementum of varying degree that may be associated with masticatory pain or thermal sensitivity. Non-surgical root canal treatment (NSRCT) is necessary for these teeth in the presence of pulpal/apical disease. To date, there are limited studies evaluating the outcomes of endodontically treated cracked teeth. **Objectives**: This in-vivo, observational study evaluated: 1) the outcome of cracked teeth receiving initial NSRCT, and 2) co-variant factors affecting the outcome. **Method**: Eligible beneficiaries, diagnosed with a cracked tooth requiring NSRCT, were consented and enrolled at the Naval Postgraduate Dental School Endodontics Department. Subject demographics, clinical presentation, and treatment details were collected on standardized forms. After 12 months, clinical and radiographic follow-up examinations were conducted. Radiographic scorings, using a modified periapical index (PAI) scoring system (1-5), were performed by 3 calibrated, board certified endodontists. Treatment outcomes were determined based on clinical and radiographic analyses (healed) and clinical symptoms alone (functional). **Results**: A subject's tooth was considered healed in the absence of clinical signs and symptoms and a PAI score of 1 or 2. A subject's tooth was considered functional in the absence of clinical symptoms. The one-year healed rate was 64% (n=73). The one-year functional rate was 79% (n=73). A subject's tooth was considered survived if it was present at recall, regardless of clinical symptoms or radiographic evaluation. The one-year survival rate was 92%. There were insufficient data to evaluate co-variant factors affecting the outcome. **Conclusion**: This interim analysis of retrospective and prospective data indicated cracked teeth requiring NSRCT had a one-year healed rate of 64%.

CHARACTERIZATION OF TITANIUM IMPLANT SURFACES AFTER ND:YAG LASER TREATMENT
LT Allison D. Weinberg, DC, USN

Introduction: Dental implants are excellent restorative solutions. They can, however, present challenging complications ranging from reversible inflammation (peri-implant mucositis) to irreversible inflammation with bone loss (peri-implantitis). Treatment modalities consist of non-surgical and surgical approaches including the use of lasers. According to the American Academy of Periodontology, evidence for laser therapy in peri-implant disease is equivocal, and there is insufficient evidence to determine the long-term impact of laser-induced implant surface alterations. **Objectives**: The purpose of this *in-vitro* study was to measure surface changes on titanium discs following neodymium-doped: yttrium, aluminum, and garnet (Nd:YAG) laser irradiation at four clinically relevant angles (0º, 10º, 20º, and 30º) to quantify laser surface damage, and determine if laser angulation influenced the damage. **Method**: 40 titanium discs were evaluated, four test groups (n=10) with 10 randomly selected discs serving as a pre-laser control group. A customized actuator assembly exposed discs to standardized Nd:YAG laser energy at a constant speed. Confocal microscopy (Zeiss LSM 980) was used to quantify surface topography of all discs in a standardized manner. **Results**: Confocal microscopy successfully provided ideal feature fidelity in small, lateral dimensions to quantify topographic values. The actuator assembly allowed a controlled and reproducible delivery of laser energy. Control disc imaging revealed microscopically irregular surfaces with an average of 16.6% local variance. **Conclusion**: The orientation of the Nd:YAG fiber-optic in the peri-implant sulcus is critical. When the Nd:YAG laser interacts with titanium, inadvertent energy can impact the surface characteristics and release titanium particles into the sulcus. Further analysis is required to determine if laser-induced alterations to the implant surface negatively impacts osseointegration.

MARGINAL FIT OF CEREC CROWNS AT DIFFERENT INTERPROXIMAL MARGIN ANGLES
CDR Robert G. Holmes, DC, USN

Introduction: Marginal fit is one of the most important criteria for the long-term clinical success of crowns. Insufficient marginal adaptation may result in increased plaque accumulation, periodontal disease, secondary caries, and restoration failure. Preparation finish line configuration has a direct effect on the marginal fit of the restoration. **Objective**: This study examined marginal fit (marginal discrepancy) of full coverage ceramic restorations milled to different finish line margins. **Materials and Methods**: Ivorine teeth were prepared with 0º, 45º, or 90º interproximal angled finish lines for full coverage ceramic crowns. The 3 abutments were duplicated in CoCr and served as master dies. CAD-CAM software was used to generate models (.stl) of the master dies and design crowns for each die. Restorations for each angle were fabricated from pre-sintered lithium disilicate blocks (n=12) using a 4-axis mill. Each restoration was securely seated on its respective master die using a device to ensure uniform pressure and proper seating for analysis. Multiple measurements were recorded on each surface (buccal, lingual, mesial, and distal) to assess horizontal and vertical marginal discrepancies (50X) using digital microscopy. Data were analyzed using 1-way ANOVA (α=0.05) and post hoc T-tests with a Bonferroni correction. **Results**: Preliminary analyses revealed mean horizontal discrepancies of; 0º, 47.39±30.45µm, 45º, 53.16±35.89µm, and 90º, 87.37±48.97µm and mean vertical discrepancies of; 0º, 92.05±51.48µm, 45º, 90.29±53.04µm, and 90º, 143.15±79.65µm. ANOVA revealed significant differences for both discrepancies between the 3 angles; horizontal $p<0.001$ and vertical $p<0.001$. Post hoc analyses revealed the following; horizontal, 0º vs. 45º $p=0.231$, 0º vs. 90º $p<0.001$, 45º vs 90º $p<0.001$, vertical; 0º vs. 45º $p=0.815$, 0º vs. 90º $p<0.001$, 45º vs 90º $p<0.001$. **Conclusions**: Interproximal margin angulation had a significant effect on marginal fit. This study found a trend in increasing horizontal and vertical marginal discrepancies with increasing margin angle.

DENTIFYING MOLECULAR DRIVER EVENTS IN ACINIC CELL CARCINOMA
LCDR Matthew E. Seedall, DC, USN

Introduction: Salivary acinic cell carcinoma (AcCC) is typically a low-grade adenocarcinoma found most commonly in the parotid gland. These tumors can undergo high grade transformation (HGT) and loco-regional recurrence and metastases. The histopathology of this tumor is characterized by acinar differentiation which suggests conserved genetic driver events that immortalize cells. Recently NR4A3 has been reported as an oncogenic transcription factor in AcCC. **Objective**: This study seeks to determine and validate NR4A3 as an oncogenic driver event in AcCC. **Methods**: Eight cases of AcCC from Walter Reed National Naval Medical Center and seven normal parotid gland cases from National Institutes of Health were used in this study. RNA and DNA extraction was performed using Qiagen AllPrep DNA/RNA Kits. The nucleic acid samples were assessed for quantity and quality using the Agilent Fragment Analyzer Capillary Electrophoresis System and National Institute of Bioinformatics and Scientific Programming Core. RNAseq data will be analyzed using ChemPipe algorithm for detecting chimeric reads and gene fusions. Fluorescence *in situ* hybridization (FISH) and immunohistochemistry (IHC) will be used to further validate the data. **Results**: DNA and RNA are still being analyzed for quality. Studies for NR4A3 require repeating. FISH studies demonstrated split signals of the NR4A3 gene locus in four out of five cases. This confirmed a break in the chromosomal regions of 4q13 and 9q31. **Conclusion**: Data analysis is ongoing. Further evidence is required to determine the usefulness of NR4A3 as a sensitive marker for AcCC.

THE EFFECTS OF THERAPY DOGS ON PATIENTS WITH DENTAL ANXIETY
LCDR Sara A. Chilcutt, DC, USN

Introduction: An estimated 6-14% of the United States population avoid dental treatment due to anxiety. Avoidance of routine dental care can precipitate deteriorating oral health requiring more complex and expensive treatment. Options for management of dental anxiety include psychological and pharmacological therapies. Therapy dogs have been used to decrease dental anxiety in children. However, there is no current research on the impact of therapy dogs on adults with dental anxiety. **Objectives**: 1) To assess the efficacy of a therapy dog intervention for dental anxiety on self-reported anxiety and comfort levels, 2) assess differences in physiological reactivity during dental care, and 3) explore associations among dental anxiety and physiological reactivity. **Methods**: Subjects were adult patients with dental anxiety and were randomized into a therapy dog group (DOG) or standard control (SC) group. DOG group participants were exposed to a therapy dog for 10 minutes at start of two dental visits. SC subjects were treated routinely for two dental visits. Study outcomes included psychological (e.g., dental anxiety) and physiological (e.g., Heart Rate Variability (HRV)) assessments using a Firstbeat electrocardiogram device. **Results**: In this ongoing study (N=17; 10 DOG, 7 SC), comfort level post-intervention was significantly different between groups ($p<0.05$) with higher comfort reported in the DOG group. There was no difference in anxiety level after the intervention or between visits ($p>0.05$). During the intervention, participants in the DOG group evidenced significantly higher HRV ($p<0.05$), but this difference was not found during the dental procedure. There was no significant association between dental anxiety score and physiological reactivity in either group. **Conclusions**: Therapy dog intervention may be effective in increasing comfort levels, and participants were very satisfied with the intervention. Therapy dog intervention shows promise as an alternative therapy in the management of adults with dental anxiety allowing them to pursue routine dental care.

CANDIDA ALBICANS ATTACHMENT TO 3D-PRINTED, CAD/CAM MILLED, AND CONVENTIONAL DENTURE RESIN
LCDR Gabrielle K. Jung, DC, USN

Introduction: Advancement in CAD/CAM processes, digital dentistry, and acrylic resin materials has provided time-efficient and cost-effective ways to fabricate complete dentures. 3D printed dental resins, and their unique processing techniques, are relatively new in concept to dentistry. Biocompatibility properties of printed resins, specifically pathological microbial adhesion to their surfaces, are not well understood. **Objective**: The purpose of this study was to compare the biofilm forming capacity of *Candida albicans* to denture resin surfaces fabricated by conventional heat processing, CAD/CAM milled, and 3D printed manufacturing methods. **Methods**: Forty-eight standardized specimens (10mm x 10mm x 2mm) were fabricated and divided into four groups: 12 conventional (Lucitone 199; Dentsply Intl.), 12 CAD/CAM milled (AvaDent CAD/CAM Denture Base Puck; Global Dental Science), 12 3D printed with FormLabs (Dentca 3D denture base; Dentca, Inc.), and 12 Lucitone Digital Print^{TM} 3D Denture Resin (Dentsply Intl.). *C. albicans* isolates were grown and diluted to 1×10^7/mL concentration in Sabouraud Dextrose Broth. *C. albicans* were allowed to attach to the specimens for 24 hrs at 37°C, and washed with phosphate-buffered saline (PBS) to remove non-adherent cells. The adherent cells were plated on Sabouraud Dextrose Agar in duplicates and Colony-Forming unit (CFU) counts were quantified. **Results**: A one-way analysis of variance (ANOVA) analysis among *C. albicans* CFUs on the four denture acrylic resin groups showed that there were no statistically significant differences in the mean attachment capacity of *C. albicans* to these acrylic resin types ($p = 0.151$). **Conclusions**: Within the limitations of this study, CAD/CAM milled and 3D printed denture resin surfaces perform as well as conventional "the gold standard" resin surfaces in preventing *C. albicans* biofilm attachment.

PAIN CATASTROPHIZING IN THE OROFACIAL PAIN POPULATION
Maj. John E. Dinan, DC, USAF

Introduction: Pain catastrophizing is a maladaptive cognitive style characterized by an exaggerated negative interpretation of pain experiences. It has been associated with greater disability and poorer outcomes in chronic pain, to include several specific orofacial pain conditions. Objective: The goal of this study was to examine pain catastrophizing at a military orofacial pain specialty clinic. Methods: This retrospective chart review (RCR) examined information collected at initial examination from 699 new patients seen between September 2016 and August 2019 at the Orofacial Pain Center at the Naval Postgraduate Dental School (Bethesda, MD). Pain catastrophizing (assessed with the Pain Catastrophizing Scale) was examined with respect to patient demographic factors, pain characteristics, psychosocial factors, and primary orofacial pain diagnosis. Analysis was performed to assess how anxiety, depression, and insomnia correlate with pain intensity and pain catastrophizing. Results: Higher pain catastrophizing was associated with higher pain intensity, depression, anxiety, insomnia, and younger age (all $p<0.05$). After controlling for all other assessed variables, a primary diagnosis of neuropathic pain was the most strongly correlated with higher pain catastrophizing. The relationship between pain intensity and pain catastrophizing was partially mediated by anxiety, depression, and insomnia with a greater mediation effect associated with higher pain levels. Conclusions: In this RCR of a population of orofacial pain patients, those diagnosed with neuropathic pain were most likely to display high levels of pain catastrophizing, a characteristic which is associated with poor long-term pain outcomes. This is the first study to show that, when adjusting for all examined variables, those suffering from neuropathic pains displayed the highest levels of pain catastrophizing. This highlights the importance of also addressing psychosocial factors in the treatment of neuropathic pain conditions, which are commonly treated using a predominantly biomedical approach.

OPTIMIZED TISSUE PREPARATION TECHNIQUE IN A CHRONIC GRAFT-VERSUS-HOST DISEASE MODEL

LCDR Eric R. Draper, DC, USN

Introduction: Hematopoietic stem cell transplantation (HSCT) is a potentially curative treatment of hematological malignancy or disease. One sequela of HSCT is development of chronic graft-versus-host disease (cGvHD), a serious complication in 30-70% of transplant recipients, and a major cause of death following HSCT. The most common target of cGVHD is the skin, followed closely by oral tissues. Mouse models approximate features of human oral cGvHD and are used to elucidate the pathogenesis of oral cGvHD. Challenges in sample preparation are well-known, resulting in the need to optimize critical laboratory steps in sample analysis. **Objective**: To test a novel protein extraction method for efficacy in the context of a cGVHD mouse model. **Methods**: An established mouse model (B10.D2 cells into BALB/c mice) was used to simulate cGvHD conditions. Splenocytes and bone marrow cells from donor mice were transplanted into irradiated recipient mice via retro-orbital injection. Recipient mice were euthanized at specified timepoints post-transplant, and submandibular gland and buccal mucosa tissues were obtained. Tissues were prepared for characterization using a novel liquid nitrogen-cooled mini mortar and pestle technique. Samples were pulverized in microcentrifuge tubes in the mini mortar and combined with appropriate buffers for western blotting (WB) and enzyme-linked immunosorbent assays (ELISA). Protein quantification via bicinchoninic acid (BCA), WB, and ELISA were performed and compared to results from standard extraction techniques. **Results**: BCA protein quantification showed extraction yields comparable to conventional methods (25.8 µg/ml vs 25.6 µg/ml for control). WB and ELISA confirmed the presence of proteins and cytokines found in cGvHD. Absence of protein degradation was verified by WB and total protein staining. **Conclusion**: Protein extraction via the liquid nitrogen-cooled mini mortar technique is an efficient way to prepare mouse oral tissues for analysis. This method will be used in future studies to characterize oral conditions of cGvHD.

INVESTIGATOR BIOGRAPHICAL SKETCHES

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PAST RECIPIENTS OF THE
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1968	CDR Richard S. Davidson	Prosthodontics
	LCDR Richard G. Preece	Prosthodontics
1969	LCDR Charles A. Brown	Oral Surgery
1970	LCDR Oscar B. Walker	General Dentistry
1971	CDR John W.R. Anderson	General Dentistry
	CDR Robert B. Annis	General Dentistry
1972	CDR Jack V. Lowman	Endodontics
	LCDR Robert S. Burke	Endodontics
1973	LCOL James W. O'Hara Jr. USAF	General Dentistry
	LCDR William G. Richardson	General Dentistry
1974	LCDR Lawrence W. Blank	Comprehensive Dentistry
1975	CDR Thomas A. Wight	Prosthodontics
	CDR John C. Bauman	Prosthodontics
1976	LCDR Steven A. Fertig	Comprehensive Dentistry
	LCDR Michael T. Hanst	Comprehensive Dentistry
1977	LCDR John J. Sanders	Periodontics
1978	LCDR Martin T. Tyler	Oral Medicine
1979	LCDR Gary R. Warnock	Oral Pathology
1980	LCDR Gordon M. Brown Jr.	Prosthodontics
1981	LCDR Johnny B. Sandifer	Periodontics
1982	LCDR Frederick A. Marsaw	Prosthodontics
1983	CDR James W. Simpson	Prosthodontics
1984	LCDR Byron P. Sansom	Prosthodontics
1985	LCDR Robert K. Flath	Endodontics
1986	LCDR William C. Roddy	Comprehensive Dentistry
1987	LCDR J. Bryan Quattlebaum	Periodontics

1989	**LCDR James J. Ware**	**Comprehensive Dentistry**	
1990	**LCDR Joseph E. Rusz Jr.**	**Comprehensive Dentistry**	
1991	**LCDR Ronald L. Bixler**	**Comprehensive Dentistry**	
1992	**MAJ Theresa S. Gonzales**	**Oral Pathology**	
1993	**LCDR Scott C. Haney**	**Comprehensive Dentistry**	
1994	**LCDR Stephen C. Iannazzo**	**Prosthodontics**	
1995	**LCDR David R. Brajdic**	**Comprehensive Dentistry**	
1996	**LCDR Daniel O. Ellert**	**Prosthodontics**	
1997	**LCDR Scott A. Jensen**	**Endodontics**	
1998	**LCDR Douglas G. Petersen**	**Periodontics**	
1999	**LCDR Arthur T. George**	**Comprehensive Dentistry**	
2000	**LCDR Glenda M. Caley**	**Periodontics**	
2001	**LCDR Scott Ozaki**	**Periodontics**	
2002	**CDR Richard W. Stevens**	**1st Place**	**Endodontics**
	CDR Nasreen S. Qader	**2nd Place**	**Endodontics**
	LCDR Kenn Kaneshiro	**3rd Place**	**Periodontics**
2003	**LT Gary Matt**	**1st Place**	**Endodontics**
	LCDR Saman Gharai	**2nd Place**	**Endodontics**
	LCDR Demetrio Domingo	**3rd Place**	**Oral Medicine**
2004	**LCDR C. L. Staadecker**	**1st Place**	**Periodontics**
	CDR Randolph A. Coffey	**2nd Place**	**Comprehensive Dentistry**
	LCDR Keith L. Mayberry	**3rd Place**	**Comprehensive Dentistry**
2005	**LT Angie Kuznia**	**1st Place**	**Periodontics**
	LCDR Melissa L. Ruff	**2nd Place**	**Endodontics**
	LCDR Walter D. Brafford	**3rd Place**	**Periodontics**
2007	**LCDR Dan J. Holtzclaw**	**1st Place**	**Periodontics**
	LCDR Michael Rudmann	**2nd Place**	**Comprehensive Dentistry**
	LCDR Koichi (Kyle) Saito	**3rd Place**	**Endodontics**
2008	**LCDR Nick D. Shumaker**	**1st Place**	**Periodontics**
	LCDR Bradley E. Jones	**2nd Place**	**Oral Pathology**
	LT Matthew B. Chesler	**3rd Place**	**Endodontics**

2009	LT Gregory L. Koontz	1st Place	Periodontics
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	LT John J. Petrini	3rd Place	Prosthodontics
	LCDR Bradley R. Ross	3rd Place	Endodontics
2010	LCDR Matthew B. Miller	1st Place	Periodontics
	LCDR Joyce Yang Turner	2nd Place	Periodontics
	LCDR Craig K. Foisie	2nd Place	Periodontics
2011	CAPT Richard P. Campbell	1st Place	Endodontics
	LCDR Garin M. Liu	2nd Place	Prosthodontics
	LCDR Nancy H. Osborne	3rd Place	Endodontics
2012	LT Geoffrey L. McMurray	1st Place	Endodontics
	LT Jeff A. Draude	2nd Place	Periodontics
	LCDR Susan E. Hinman	3rd Place	Endodontics
2013	LT Gregory Gittleman	1st Place	Comprehensive Dentistry
	LT Katherine Cheng	2nd Place	Comprehensive Dentistry
	CDR Jay Geistkemper	3rd Place	Endodontics
2014	LT Rachael Werner	1st Place	Oral/Maxillofacial Path
	LCDR Evan Whitbeck	2nd Place	Endodontics
	LCDR Scott A. Pasita	3rd Place	Periodontics
2015	LCDR Teresita Alston	1st Place	Periodontics
	LT James Hawkins	2nd Place	Orofacial Pain
	LT James Linkous	3rd Place	Prosthodontics
2016	MAJ Karen E. González Torres	1st Place	Oral/Maxillofacial Path
	LT Spencer W. Bjarnason	2nd Place	Endodontics
	LCDR Bryan Rasmussen	3rd Place	Prosthodontics
2017	LT Michael K. Yang	1st Place	Periodontics
	LCDR Preston M. Criddle	2nd Place	Orofacial Pain
	LCDR Joshua C. Treesh	3rd Place	Prosthodontics
2018	LCDR Abigail L. Schmidt	1st Place	Orofacial Pain
	LT Travis J. Vertolli	2nd Place	Comprehensive Dentistry
	LT Craig E. Hofferber	3rd Place	Periodontics
2019	LCDR Elizabeth A. Polak	1st Place	Periodontics
	MAJ Parth Mewar	2nd Place	Oral/Maxillofacial Path
	Maj Kimberly N. Tong	3rd Place	Oral/Maxillofacial Path